

Interviewing women mathematicians

Sara Azzali

(Talk at the opening of the Exhibition at the University of Konstanz, October 19th, 2017)

Acknowledgements

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This touring exhibition that you will enjoy here in Konstanz from the 19th of October to the 16th of November has been travelling around Europe since July 2016 to more than 50 venues.

Today's opening in Konstanz takes a very special significance since it closes a circle in "coming back to its origin", as the roots of the exhibition project can be traced back here in the KWM project! More to come on its origins!

We are therefore thankful to you for hosting the exhibition in its original form, the first time it is shown after the restauration following the first round of travels (and for being patient of some small inconveniences on the way to Konstanz).

Plan

This is the plan of this talk: I will

- ⑩ I. give a short presentation and history of its realisation
- ⑩ II. talk about the interviews, following two main themes
- ⑩ III. tell you about the touring and some of the initiatives that were triggered by the exhibition

Part I. Presentation and history

What is the "Women of mathematics throughout Europe. A gallery of portraits,, project?

The exhibition consists of photo portraits and interviews of 13 women mathematicians from Europe. Realised in 2015, it is designed for touring so that any mathematical department or other institution can host it (either in this original form, or receiving a pdf file and printing a new version).

I will start telling you the story of the exhibition, the ideas underlying this project, and present you the team of people who realised it.

Born from a rib of the KWM project...

In 2013 Sylvie Paycha (Professor, University of Potsdam) was invited to give a talk here at the *Konstanz Women in Mathematics Lecture Series* and she decided to report on dialogues with ten women mathematicians around the world whom she met during her career and who have very positively impressed her as persons; they all accepted to answer a series of the questions. As a result, she wrote a small booklet, on which she reported in the talk.

The idea of the exhibition

After the talk here in Konstanz, Sylvie repeated the experiment, giving this talk in a couple of other math departments and was surprised to meet a genuine interest from various mixed (men and women) audiences! Why?

Because these women mathematicians are a mixed group of scientists, coming from very diverse backgrounds, some of them are more “famous”, others less, some of them are young, others have already a long career behind them, moreover:

- the dialogues about their experience always simulate discussions
- they share their thoughts about the condition of women in their country
- what Sylvie calls the “scientific trajectories” of these women are very much intertwined with their lives
- one can reflect on choices, possible difficulties, joys of the work.

Since the topic raised interest, Sylvie started thinking of making a short movie with the protagonists of the booklet. But Agnes Handwerk, the journalist and video maker she got in touch with, thought it would be a too ambitious project and suggested instead to think of a professional photo exhibition, that could be presented at the European Congress of Mathematics in Berlin, 2016.

The idea of adding professional Photo portraits

Sylvie asked Noel Matoff for her collaboration: Noel is a professional photographer from Berlin, whose work on social themes Sylvie was acquainted with: Noel has portrayed midwives in action, people suffering of Alzheimer, she has made portraits of women/daughters, as well as of siblings as you can see from her web page <http://www.matoff.de/de/kontakt/>. Noel who was intrigued by this idea accepted to take part in this project.

Then came the time to figure out how to realise the project!

At the same time, I was starting working at Potsdam University and Sylvie asked me whether I would be ready to help out with the project, which I was very happy to do.

What the exhibition has to be and why:

Focusing on the European panorama (because we aimed at an opening during the ECM), we planned:

- interviews of a group of women mathematicians
- and portrait images
- make the touring possible.

To get visibility, we wanted the professional eye of photographer, big panels, and as said the starting point was to be the European Congress of Mathematics, Berlin 2015. We aimed at visibility, one of the starting point being the fact that women are underrepresented in maths departments and tend to be less visible to both the scientific community and of the general public.

We chose women working in different mathematical areas, from different counties, at different stages of their career. It turned out that 10 of them are professors.

Leaving aside the fact that they come from different countries, in a medium-large size department you could actually imagine to meet all these 13 women together... this is often not the case! But let's hope it will be so in the future.

Subjectivity

One of the keywords of the exhibition is subjectivity, for two main reasons:

- we chose to put the focus on the (woman) mathematician as a person, a subject who creates maths, rather than focusing on the object of her mathematical work;
- there are plenty of subjective choices we've made in planning and realising the exhibition, starting from the fact that we are choosing 13 (a number chosen by Noel) women to be portrayed, following the criteria of having a diversity of people and stories (while remaining in the European academic panorama). As a result, excellence criteria are not the driving thread for this exhibition.

Searching for funding

The choice we made to work-with a professional photographer, to have catalogues printed, and touring panels, made the exhibition a rather expensive project, requiring much more funding than one single university department for “equal opportunity” could possibly afford.

We nevertheless chose to be ambitious and gave it a try. For this we needed large resources and at that stage encountered many difficulties:

- typically, mathematical associations do not want to fund a project which is not merely scientific but more a hybrid of social sciences, art, and biographic studies.
- moreover they typically want to take part in the choice of the protagonists, the portrayed mathematicians, requiring only “outstanding names”. Instead we wanted to have a variety of women, at different stages of their career, in a logic of inclusion, so that most people could relate to these models. One has to be aware that an elitist perspective tends to exclude those who are not elected. In contrast, we wanted to present a diverse panorama of women mathematicians.

While staying in the domain of pure mathematics (a choice which can rightly be criticised), we also wanted to have a broad spectrum of topics represented in the exhibition, encouraging the dialogue between disciplines.

Our sponsors

A decisive step in the realisation came with the cooperation in our team of Alexandra Antoniouk (Kiev, Ukraine).

She submitted, together with Sylvie, the exhibition project for a prize of from the Humboldt foundation dedicated to “network initiatives” and she won it.

At the very beginning, when writing the proposal, we did not view the networking as the central point, but a posteriori we realised that the exhibition is indeed serving a networking purpose beyond what we ever imagined.

The exhibition can travel and this can trigger new scientific connections between scientists more so it can encourage them to exchange programs and ideas. For instance, the fact that I am today here in

Konstanz and that I will take the opportunity to ask some questions to Maria on her work is also a result of this network.

After the Humboldt prize, we continued applying and found support from the Bosch foundation and then from other institutions, which we can now warmly thank for their support:

- Humboldt foundation
- Bosch foundation
- London Mathematical Society
- Berlin Mathematical School
- Potsdam University
- Maecenia Foundation.

We then started the first part of the realisation: the interviews. We invited the 13 women mathematicians to take part in the project and they very kindly accepted to be portrayed and interviewed.

The ritual of the interviews and the meeting in Cortona

This took place over a little more than one year in 2015. The first portrayed mathematician was Nalini, whom we interviewed by Skype. Then she came to Potsdam for a colloquium and Noel took pictures of her.

Seven interviews were taken during the meeting “European Women in Mathematics” in Cortona (Italy), in August 2015. Noel accompanied us during the week of the meeting (where thanks to EWM we could take part with 9 of our protagonists) and after the talks or during the lunch break we scheduled interviews, and photo shooting.

A kind of ritual took place, to which all the 13 mathematicians very willingly took part: we started talking informally at the blackboard, the portrayed person was asked to give us a short improvised presentation about her research work. During these lively mathematical conversations, Noel would make a first series of photographs. The interviews would be made either before or after these portrait sessions. The portrayed mathematician would then be asked to pose in front of a formula left on the board for a second series of photographs (with a special camera).

The formula that you see on the panel is her preferred mathematical formula, that now illustrates in the catalogue the chapter dedicated to her.

We took time for explanations, to chat together and ask further questions, sometimes very nice spontaneous interactions took over and we gave up taking notes. We believe that this lively and genuine exchange is reflected in the photographs and interviews the reader will find in this volume. This for me was the most exciting part of the work, and I have a very vivid memory of these enriching dialogues.

The eye of a photographer

The presence of a professional photographer in the team clearly had an influence on the way the project was conducted. The eye of Noel is not only that of an artist who is going to take a beautiful picture, it is also that of an artist interested in the relationship between the person (in this case the women) and her profession Noel was eager to be told in a few words, what the research topics we were discussing were about!

Explaining our maths to a lay person is something we mathematicians all experience when we asked by our friends or family. This sometimes produces nice exemplificative pictures of the mathematical problems, like: studying soap bubbles, or studying donuts...

The full team

At that point we started to work on editing the interviews. Magdalena Georgescu (from Romania-Canada) joined the team and added her crucial help in realising the panels, editing the interviews in the form which is now the catalogue, keeping in touch with all the protagonists to work in accordance with their choices. It was with the help of the interviewed mathematicians, that we chose excerpts of the interviews which you now see on the panels as short citations.

Shortly after, Ammar Al Saedy and Pascale Castro-Belloc also joined our team.

Part II. Interviews and the importance of talking to people

During the interviews in Cortona and in Potsdam we were confronted with several questions and considerations. Reading the interviews you can follow up different themes of which I will mention a few, that I feel are very important in relation to today's meeting in Konstanz, and that your KWM project has been promoting for several years.

1) The first is the importance of mentoring programs in order to:

- be aware at all stages of the mechanisms that influence women's participation: lack of self-confidence, self-censureship;
- talking to one's peers and seniors, in the form of mentoring, to share one's difficulties with them can be the key to solve them. In many interviews the advice given by the mathematicians to young students (actually both men and women) is:

Karin Baur (Graz) *"Talking to people with whom you share your experiences keeps you on track. You should not hesitate to ask questions, including on people's life experience. When I was a student, I remember asking a physics female professor whom I knew, how she combined family and career, since this is what I was trying to do."* She adds: *"Our job is not easy and requires both courage and endurance. You cannot relax; it is like running a marathon, with the difference that you do not know when it ends!"*

This can be of great help at the early stages of a career, for example when looking for a PhD advisor: Karin Baur also remembers that when her master studies professor did not accept her as a PhD student: *"With the help of a student advisor, I looked up which professors in Switzerland were working in the areas I was interested in (algebraic geometry and algebra) and went to various places in Switzerland (Geneva, Bern, Basel, Lausanne) in search of a PhD adviser"*.

Katrin Wendland says *"I used to have many doubts about myself, particularly when between my Masters and my PhD. With time I learned to gain in patience, and doubt less. I now realize from my experience as a mentor for young women mathematicians, that women have more doubts about themselves than men do. During the rough time I had between my Masters and my PhD, I kept myself going by thinking that, since I had the privilege over many others to have gone that far, it was my duty to keep going."*

2) a second theme that I would like to address is in some sense related to the KWM goal of “spreading women vision of mathematics”.

Women and unconventional solutions

Some of our protagonists have followed “less conventional solutions”, both to make family life and work compatible, or because they were determined to continue doing research even in difficult situations.

Margarita Mendes Lopes (Portugal): *"Shortly after my degree in mathematics, I got a job in Lisbon as an assistant. At that time it was possible, with some effort, to get a grant to do a PhD abroad. So in 1980, I chose to do my PhD in Warwick, where I spent three years and had my first child. Then my husband, who is an engineer, and I returned to Lisbon with the child. I actually had my three children in five years, / which, combined with a high teaching load, made it difficult to finish writing my PhD thesis. During the last stage of writing up my thesis, my intention was to finish as soon as possible and then try to find a completely different job; but in the process of writing I got enthusiastic again for research."*

Karin Baur *"During my postdoc years I had some doubts whether to continue, in great part due to the uncertainty of getting a permanent position one day."* She already had 4 children.
"My father suggested I should wait until the age of 45 before opting for another type of job. In Switzerland, there are many good options for trained mathematicians outside academia. I got my first permanent position as a mathematician at the age of 41 and am grateful to my father for his comforting advice."

This diversity of the scientific trajectories of these women should serve as an encouragement in not giving up fighting to find solutions. I think I am not mistaken when claiming that women have the merit and the strength for opening new paths, sometimes after difficult battles.

Some of the issues raised in the interviews with the 13 mathematicians are not specific to this profession and can be encountered in other jobs.

In the catalogue, one can read about another profession where females are so far very much underrepresented: music composers. This also sets a link to today's event where Ingrid Carbone who is both a mathematician and a professional piano player will give a concert.

When we were planning opening in Berlin, Sylvie Paycha suggested to invite a woman composer and to organise a concert performing some of her work during the opening.

We then had the chance to meet Elena Mendoza and she very kindly accepted to be interviewed as well. We did not need to change much in the set of questions we were asking her... Reading the interview with Elena, reveals how much she as a composer shares with women mathematicians.

Part III. The touring

A box to be filled with new ideas

The touring exhibition very soon became autonomous, and turned into a box that can be filled with new ideas. That's why we encourage the hosts to combine the opening with other events.

- It has been shown during several meetings and conferences.
- It can be used to advertise initiatives in a maths department (library, or high school) to support diversity (Bielefeld, Konstanz, Bonn, Paris IHP)
- It can be combined with training days for secondary school teachers or orientation day for female students, as in Rome: <http://womeninmath.net/venue/rome-italy/>
- in Perpignan (France) it was the object of a school project with presentations by school children, one on some exotic maths they had built changing the usual multiplication and summation rules.

The exhibition has reached out to other continents and for example in

- Santiago (Chile) it will be shown together with photographs and short biographies of Latin American women mathematicians as from March 8th 2018;
- We advertise that the exhibition panels have been translated to German (and French) and they are in the process of being translated to Spanish.

Concluding remarks

After the interviews the dialogues continue (thanks to the touring) and not only:

The following messages are important to convey and keep in mind:

- one should **be aware at all stages of the mechanisms that influence women's participation**
- excellence can be an obstacle to inclusion
- any action that can help reinforce the self-confidence, such as mentoring should be encouraged
- stereotypes should be fought against by counter stereotypes, which need to be advertised and images can be helpful for this purpose.

References

- Sylvie Paycha, *Introduction of the catalogue "Women of mathematics"*
- Sylvie Paycha: *"Penser les différences en compagnie des mathématiciennes européennes"*
- Opening of Perpignan's exhibition (France 2017)
- Moira Chas: *"Diversity in Maths"*, Talk given at Topology Ecuador in August 2017, www.usfq.edu.ec/eventos/topology/Documents/presentaciones/diversity_in_mathematics_moira_chas.pdf
- Terence Tao's blog: *"Does one have to be a genius to do maths?"* <https://terrytao.wordpress.com/career-advice/does-one-have-to-be-a-genius-to-do-maths/>
- Jo Handelsman and Natasha Sakraney *"Implicit bias"* www.whitehouse.gov/sites/default/files/microsites/ostp/bias_9-14-15_final.pdf
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